Supplementary Table 1 – Baseline characteristics for excluded versus not excluded procedures.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | | | |
| **Variable** | **% non missing** |  | **All procedures N=156,908** | **Included**  **133,970** | **Operator volume and mortality missing**  **N=22,938** | **Operator volume missing**  **N=16,680** | **Mortality missing**  **N=7,078** |
|  |  |  |  |  |  |  |  |
| Age | *100* | <50 | 17486 (11.1) | 14735 (11.0) | 2751 (12.0) | 1850 (11.1) | 1019 (14.4) |
|  |  | 50-59 | 34746 (22.1) | 29580 (22.1) | 5166 (22.5) | 3689 (22.1) | 1669 (23.6) |
|  |  | 60-69 | 45665 (29.1) | 39092 (29.2) | 6573 (28.7) | 4842 (29.0) | 1974 (27.9) |
|  |  | 70-79 | 38935 (24.8) | 33418 (24.9) | 5517 (24.1) | 4098 (24.6) | 1596 (22.5) |
|  |  | 80+ | 20076 (12.8) | 17145 (12.8) | 2931 (12.8) | 2201 (13.2) | 820 (11.6) |
| Sex | *100* | Male | 116635 (74.3) | 99548 (74.3) | 17087 (74.5) | 12264 (73.5) | 5431 (76.7) |
|  |  | Female | 40273 (25.7) | 34422 (25.7) | 5851 (25.5) | 4416 (26.5) | 1647 (23.3) |
| Ethnicity | *78.9* | Asian | 8773 ( 7.1) | 7587 ( 7.1) | 1186 ( 7.0) | 657 ( 5.0) | 574 (13.1) |
|  |  | Black | 1116 ( 0.9) | 835 ( 0.8) | 281 ( 1.7) | 224 ( 1.7) | 66 ( 1.5) |
|  |  | White | 104817 (84.6) | 90476 (84.5) | 14341 (85.0) | 11558 (88.7) | 3254 (74.2) |
|  |  | Other | 9167 ( 7.4) | 8113 ( 7.6) | 1054 ( 6.3) | 595 ( 4.6) | 494 (11.3) |
| Smoking | *90.8* | Never | 52913 (37.1) | 45631 (37.4) | 7282 (35.7) | 5073 (34.6) | 2424 (37.5) |
|  |  | Former | 55140 (38.7) | 47446 (38.9) | 7694 (37.7) | 5734 (39.1) | 2254 (34.9) |
|  |  | Current | 34452 (24.2) | 29009 (23.8) | 5443 (26.7) | 3871 (26.4) | 1783 (27.6) |
| Dialysis | *93.6* |  | 1522 ( 1.0) | 1275 ( 1.0) | 247 ( 1.1) | 165 ( 1.1) | 89 ( 1.3) |
| Diabetes | *96.1* |  | 31947 (21.2) | 27333 (21.2) | 4614 (21.0) | 3293 (20.6) | 1459 (21.6) |
| PCI | *97.9* |  | 37853 (24.6) | 32454 (24.7) | 5399 (24.1) | 3933 (24.1) | 1612 (23.6) |
| CABG | *75.8* |  | 11075 ( 9.3) | 9500 ( 9.4) | 1575 ( 9.0) | 1065 ( 8.6) | 551 (10.2) |
| MI | *94.0* |  | 39180 (26.6) | 33548 (26.6) | 5632 (26.6) | 4037 (26.5) | 1738 (26.9) |
| CVA | *95.0* |  | 6231 ( 4.2) | 5386 ( 4.2) | 845 ( 3.9) | 687 ( 4.4) | 191 ( 2.8) |
| HC | *95.0* |  | 80197 (53.8) | 67412 (52.9) | 12785 (59.0) | 9768 (62.2) | 3440 (50.8) |
| Hypertension | *95.0* |  | 83183 (55.8) | 71072 (55.8) | 12111 (55.8) | 8884 (56.6) | 3611 (53.3) |
| PVD | *95.0* |  | 7557 ( 5.1) | 6340 ( 5.0) | 1217 ( 5.6) | 938 ( 6.0) | 307 ( 4.5) |
| VHD | *95.0* |  | 2487 ( 1.7) | 2216 ( 1.7) | 271 ( 1.2) | 191 ( 1.2) | 82 ( 1.2) |
| LVEF | *48.9* | Good (> 50%) | 52935 (69.0) | 45639 (70.1) | 7296 (62.8) | 5349 (62.7) | 2271 (63.4) |
|  |  | Fair (30-50%) | 18825 (24.5) | 15342 (23.6) | 3483 (30.0) | 2604 (30.5) | 1017 (28.4) |
|  |  | Poor (< 30%) | 4975 ( 6.5) | 4128 ( 6.3) | 847 ( 7.3) | 577 ( 6.8) | 296 ( 8.3) |
| Indication | *100* | Elective | 53056 (33.8) | 46373 (34.6) | 6683 (29.1) | 5187 (31.1) | 1682 (23.8) |
|  |  | UA/nSTEMI | 59216 (37.7) | 50562 (37.7) | 8654 (37.7) | 6211 (37.2) | 2799 (39.5) |
|  |  | STEMI | 44636 (28.4) | 37035 (27.6) | 7601 (33.1) | 5282 (31.7) | 2597 (36.7) |
| Shock | *98.9* |  | 4697 ( 3.0) | 3804 ( 2.9) | 893 ( 4.0) | 594 ( 3.7) | 330 ( 4.8) |
| Ventilated | *89.3* |  | 3020 ( 2.2) | 2368 ( 2.0) | 652 ( 3.2) | 428 ( 2.9) | 240 ( 3.9) |
| IABP | *97.2* |  | 2304 ( 1.5) | 1848 ( 1.4) | 456 ( 2.0) | 321 ( 1.9) | 158 ( 2.3) |
| CP support | *97.2* |  | 157 ( 0.1) | 139 ( 0.1) | 18 ( 0.1) | 7 ( 0.0) | 12 ( 0.2) |
| Inotropes | *97.2* |  | 1594 ( 1.0) | 1311 ( 1.0) | 283 ( 1.3) | 179 ( 1.1) | 114 ( 1.6) |
| Access | *98.6* | Femoral | 44232 (28.6) | 38302 (28.9) | 5930 (26.6) | 3995 (24.8) | 2324 (33.3) |
|  |  | Radial | 105176 (68.0) | 89449 (67.5) | 15727 (70.6) | 11691 (72.6) | 4431 (63.6) |
|  |  | Multiple | 4932 ( 3.2) | 4379 ( 3.3) | 553 ( 2.5) | 374 ( 2.3) | 196 ( 2.8) |
|  |  | Other | 402 ( 0.3) | 346 ( 0.3) | 56 ( 0.3) | 39 ( 0.2) | 19 ( 0.3) |
| Left-main | *100* |  | 7547 ( 4.8) | 6419 ( 4.8) | 1128 ( 4.9) | 797 ( 4.8) | 356 ( 5.0) |
| Multi-vessel | *100* |  | 20861 (13.3) | 17899 (13.4) | 2962 (12.9) | 2140 (12.8) | 904 (12.8) |
| Stent type | *96.8* | No stents | 11680 ( 7.7) | 10069 ( 7.8) | 1611 ( 7.3) | 1189 ( 7.4) | 471 ( 7.0) |
|  |  | BMS only | 11943 ( 7.9) | 10299 ( 7.9) | 1644 ( 7.4) | 1165 ( 7.2) | 543 ( 8.0) |
|  |  | DES only | 125156 (82.4) | 106667 (82.2) | 18489 (83.5) | 13486 (83.6) | 5640 (83.3) |
|  |  | BMS and DES | 3130 ( 2.1) | 2729 ( 2.1) | 401 ( 1.8) | 297 ( 1.8) | 120 ( 1.8) |
| Anti-platelets | *79.5* | Clopidogrel | 91305 (73.2) | 79157 (73.1) | 12148 (73.9) | 8621 (72.5) | 3975 (77.7) |
|  |  | Prasugrel | 8846 ( 7.1) | 7236 ( 6.7) | 1610 ( 9.8) | 1304 (11.0) | 352 ( 6.9) |
|  |  | Ticagrelor | 24256 (19.4) | 21646 (20.0) | 2610 (15.9) | 1912 (16.1) | 769 (15.0) |
|  |  | Ticlopidine | 370 ( 0.3) | 294 ( 0.3) | 76 ( 0.5) | 57 ( 0.5) | 22 ( 0.4) |
| Warfarin | *94.8* |  | 1912 ( 1.3) | 1554 ( 1.2) | 358 ( 1.7) | 293 ( 1.9) | 72 ( 1.1) |
| Bivalirudin | *94.8* |  | 8202 ( 5.5) | 6878 ( 5.4) | 1324 ( 6.1) | 1017 ( 6.5) | 343 ( 5.2) |
| GP IIb/IIIa | *96.1* |  | 26150 (17.3) | 22345 (17.3) | 3805 (17.5) | 2582 (16.5) | 1338 (19.9) |
| 30-day death | *95.5* |  | 4074 ( 2.7) | 3538 ( 2.6) | 536 ( 3.4) | 536 ( 3.4) | - |
| In-hospital death | *98.3* |  | 2578 ( 1.7) | 2086 ( 1.6) | 492 ( 2.3) | 358 ( 2.3) | 147 ( 2.2) |
| In-hospital MACE | *98.3* |  | 3639 ( 2.4) | 2984 ( 2.3) | 655 ( 3.0) | 480 ( 3.1) | 189 ( 2.8) |
|  |  |  |  |  |  |  |  |

BMS, Bare Metal Stents; CABG Coronary Artery Bypass Grafting; CP, Cardio-Pulmonary; CVA, Cardiovascular Accident; DES, Drug-eluting Stents; GP, Glyco-protein; HC, Hypercholesterolaemia; IABP, Intra-Aortic Balloon Pump; LVEF, Left-Ventricular Ejection Fraction; MACE, Major Adverse Cardiovascular Event; MI, Myocardial Infarction; NSTEMI, Non-ST-Elevation Myocardial Infarction; PCI, Percutaneous Coronary Intervention; PVD, Peripheral Vascular Disease; Q1-Q4, 1st to 4th Quartile; STEMI, ST-Elevation Myocardial Infarction; UA, Unstable Angina; VHD, Valvular Heart Disease.

Supplementary Table 2a – Mixed-effect logistic regression model, 30-day mortality, all procedures, N=133,970

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **30-day mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.19 | (1.09, 1.28) | <0.001 |
| Age, per 10 years | 0.78 | (0.59, 1.03) | 0.079 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | <0.001 |
| Ethnicity (White) | 1.00 | - |  |
| Asian | 1.07 | (0.90, 1.27) | 0.459 |
| Black | 0.53 | (0.28, 0.98) | 0.045 |
| Other | 0.98 | (0.81, 1.18) | 0.810 |
| Indication (Elective) | 1.00 | - |  |
| UA/NSTEMI | 3.09 | (2.64, 3.62) | <0.001 |
| STEMI | 8.24 | (7.03, 9.66) | <0.001 |
| Shock | 4.75 | (4.23, 5.33) | <0.001 |
| Ventilated | 6.48 | (5.74, 7.31) | <0.001 |
| IABP | 1.50 | (1.30, 1.73) | <0.001 |
| CP | 3.71 | (2.30, 6.00) | <0.001 |
| Inotropes | 1.97 | (1.66, 2.34) | <0.001 |
| MI | 0.98 | (0.89, 1.08) | 0.730 |
| CABG | 0.87 | (0.75, 1.02) | 0.079 |
| Hypertension | 0.97 | (0.89, 1.06) | 0.463 |
| High-cholesterol | 0.89 | (0.82, 0.98) | 0.012 |
| Stroke | 1.42 | (1.23, 1.64) | <0.001 |
| VHD | 1.92 | (1.57, 2.34) | <0.001 |
| PVD | 1.44 | (1.26, 1.64) | <0.001 |
| Left-main stem targeted | 1.99 | (1.75, 2.25) | <0.001 |
| Diabetes | 1.52 | (1.39, 1.66) | <0.001 |
| Dialysis | 2.55 | (1.98, 3.29) | <0.001 |
| Smoking (non-smoker) | 1.00 | - |  |
| Former smoker | 0.98 | (0.88, 1.08) | 0.632 |
| Current smoker | 0.99 | (0.89, 1.11) | 0.872 |
| LVEF (Good, > 50%) | 1.00 | - |  |
| Fair, 30-50% | 2.40 | (2.14, 2.69) | <0.001 |
| Poor, < 30% | 5.47 | (4.76, 6.28) | <0.001 |
| Centre volume, per 100 procedures | 1.00 | (1.00, 1.00) | 0.453 |
| Operator volume, per 100 procedures | 0.99 | (0.93, 1.05) | 0.725 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.283; Hospital = 0.126 | | |

Supplementary Table 2b – Mixed-effect logistic regression model, 30-day mortality, ACS procedures only, N=87,597

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **30-day mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.18 | (1.08, 1.29) | <0.001 |
| Age, per 10 years | 0.78 | (0.58, 1.07) | 0.120 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | <0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 1.09 | (0.90, 1.31) | 0.392 |
| Black | 0.58 | (0.29, 1.13) | 0.110 |
| Other | 0.98 | (0.80, 1.22) | 0.880 |
| STEMI (vs UA/NSTEMI) | 2.65 | (2.40, 2.93) | <0.001 |
| Shock | 4.78 | (4.22, 5.42) | <0.001 |
| Ventilated | 6.58 | (5.76, 7.52) | <0.001 |
| IABP | 1.47 | (1.25, 1.72) | <0.001 |
| CP | 3.71 | (2.20, 6.27) | <0.001 |
| Inotropes | 1.90 | (1.58, 2.29) | <0.001 |
| MI | 0.95 | (0.85, 1.06) | 0.384 |
| CABG | 0.86 | (0.72, 1.03) | 0.098 |
| Hypertension | 0.99 | (0.90, 1.10) | 0.876 |
| High-cholesterol | 0.89 | (0.80, 0.98) | 0.019 |
| Stroke | 1.40 | (1.19, 1.64) | <0.001 |
| VHD | 1.99 | (1.58, 2.52) | <0.001 |
| PVD | 1.41 | (1.21, 1.65) | <0.001 |
| Left-main stem targeted | 2.00 | (1.73, 2.31) | <0.001 |
| Diabetes | 1.50 | (1.35, 1.66) | <0.001 |
| Dialysis | 2.51 | (1.87, 3.36) | <0.001 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.98 | (0.88, 1.10) | 0.778 |
| Current smoker | 0.99 | (0.87, 1.12) | 0.854 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 2.40 | (2.10, 2.74) | <0.001 |
| Poor, < 30% | 5.54 | (4.75, 6.46) | <0.001 |
| Centre volume, per 100 procedures | 1.00 | (0.99, 1.01) | 0.673 |
| Operator volume, per 100 procedures | 0.96 | (0.83, 1.11) | 0.545 |
| Operator ACS volume, per 100 procedures | 1.04 | (0.83, 1.31) | 0.719 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.296; Hospital = 0.123 | | |

Supplementary Table 2c – Mixed-effect logistic regression model, 30-day mortality, PPCI procedures only, N=36,048

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **30-day mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.19 | (1.06, 1.33) | 0.003 |
| Age, per 10 years | 0.78 | (0.54, 1.13) | 0.184 |
| Age-squared, per 10 years2 | 1.01 | (1.00, 1.01) | <0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 1.00 | (0.78, 1.30) | 0.985 |
| Black | 0.52 | (0.21, 1.30) | 0.162 |
| Other | 1.03 | (0.79, 1.35) | 0.821 |
| Shock | 4.33 | (3.75, 5.00) | <0.001 |
| Ventilated | 7.01 | (5.99, 8.19) | <0.001 |
| IABP | 1.49 | (1.24, 1.80) | <0.001 |
| CP | 4.05 | (2.26, 7.27) | <0.001 |
| Inotropes | 1.79 | (1.45, 2.22) | <0.001 |
| MI | 0.91 | (0.77, 1.07) | 0.241 |
| CABG | 0.77 | (0.57, 1.03) | 0.077 |
| Hypertension | 0.99 | (0.88, 1.12) | 0.885 |
| High-cholesterol | 0.88 | (0.77, 1.00) | 0.049 |
| Stroke | 1.51 | (1.22, 1.87) | <0.001 |
| VHD | 2.53 | (1.74, 3.69) | <0.001 |
| PVD | 1.47 | (1.18, 1.81) | <0.001 |
| Left-main stem targeted | 2.12 | (1.73, 2.61) | <0.001 |
| Diabetes | 1.55 | (1.35, 1.78) | <0.001 |
| Dialysis | 2.14 | (1.23, 3.70) | 0.007 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.95 | (0.83, 1.10) | 0.509 |
| Current smoker | 0.93 | (0.80, 1.09) | 0.388 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 2.23 | (1.86, 2.67) | <0.001 |
| Poor, < 30% | 5.12 | (4.22, 6.21) | <0.001 |
| Centre volume, per 100 procedures | 1.00 | (0.99, 1.01) | 0.722 |
| Operator volume, per 100 procedures | 0.93 | (0.84, 1.03) | 0.149 |
| Operator primary volume, per 100 procedures | 1.27 | (0.92, 1.77) | 0.151 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.327; Hospital = 0.071 | | |

Supplementary Table 3a – Mixed-effect logistic regression model, in-hospital mortality, all procedures, N=138,627

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.40 | (1.25, 1.57) | <0.001 |
| Age, per 10 years | 0.77 | (0.53, 1.12) | 0.168 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | <0.001 |
| Ethnicity (White) | 1.00 | - |  |
| Asian | 0.97 | (0.78, 1.20) | 0.764 |
| Black | 0.66 | (0.29, 1.53) | 0.333 |
| Other | 0.94 | (0.71, 1.25) | 0.689 |
| Indication (Elective) | 1.00 | - |  |
| UA/nSTEMI | 4.19 | (3.14, 5.60) | <0.001 |
| STEMI | 13.83 | (10.37, 18.45) | <0.001 |
| Shock | 5.88 | (5.08, 6.80) | <0.001 |
| Ventilated | 5.96 | (5.10, 6.97) | <0.001 |
| IABP | 1.34 | (1.13, 1.60) | <0.001 |
| CP | 4.35 | (2.63, 7.20) | <0.001 |
| Inotropes | 2.14 | (1.77, 2.60) | <0.001 |
| MI | 1.10 | (0.96, 1.26) | 0.156 |
| CABG | 0.87 | (0.70, 1.09) | 0.230 |
| Hypertension | 0.94 | (0.84, 1.06) | 0.339 |
| High-cholesterol | 0.88 | (0.78, 1.01) | 0.061 |
| Stroke | 1.43 | (1.18, 1.74) | <0.001 |
| VHD | 1.90 | (1.42, 2.55) | <0.001 |
| PVD | 1.54 | (1.28, 1.86) | <0.001 |
| Left-main stem targeted | 2.28 | (1.93, 2.70) | <0.001 |
| Diabetes | 1.45 | (1.27, 1.65) | <0.001 |
| Dialysis | 2.01 | (1.38, 2.92) | <0.001 |
| Smoking (non-smoker) | 1.00 | - |  |
| Former smoker | 0.96 | (0.83, 1.10) | 0.527 |
| Current smoker | 0.86 | (0.74, 1.01) | 0.070 |
| LVEF (Good, > 50%) | 1.00 | - |  |
| Fair, 30-50% | 2.03 | (1.71, 2.41) | <0.001 |
| Poor, < 30% | 5.39 | (4.41, 6.59) | <0.001 |
| Centre volume, per 100 procedures | 1.06 | (1.03, 1.10) | <0.001 |
| Operator volume, per 100 procedures | 1.02 | (0.93, 1.12) | 0.643 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.351; Hospital = 0.824 | | |

Supplementary Table 3b – Mixed-effect logistic regression model, in-hospital mortality, ACS procedures only, N=91,178

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.38 | (1.23, 1.55) | < 0.001 |
| Age, per 10 years | 0.76 | (0.53, 1.11) | 0.158 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | < 0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 0.99 | (0.79, 1.24) | 0.937 |
| Black | 0.68 | (0.30, 1.57) | 0.368 |
| Other | 0.91 | (0.68, 1.23) | 0.546 |
| STEMI (vs UA/NSTEMI) | 3.28 | (2.87, 3.76) | < 0.001 |
| Shock | 6.01 | (5.20, 6.96) | < 0.001 |
| Ventilated | 5.98 | (5.12, 6.99) | < 0.001 |
| IABP | 1.30 | (1.09, 1.54) | 0.004 |
| CP | 4.20 | (2.53, 6.96) | < 0.001 |
| Inotropes | 2.07 | (1.70, 2.51) | < 0.001 |
| MI | 1.07 | (0.93, 1.23) | 0.318 |
| CABG | 0.85 | (0.68, 1.08) | 0.184 |
| Hypertension | 0.94 | (0.83, 1.06) | 0.296 |
| High-cholesterol | 0.89 | (0.78, 1.02) | 0.083 |
| Stroke | 1.43 | (1.17, 1.74) | < 0.001 |
| VHD | 1.95 | (1.44, 2.66) | < 0.001 |
| PVD | 1.53 | (1.26, 1.86) | < 0.001 |
| Left-main stem targeted | 2.28 | (1.92, 2.71) | < 0.001 |
| Diabetes | 1.44 | (1.26, 1.64) | < 0.001 |
| Dialysis | 2.07 | (1.41, 3.05) | < 0.001 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.95 | (0.82, 1.10) | 0.477 |
| Current smoker | 0.85 | (0.72, 1.00) | 0.049 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 2.03 | (1.70, 2.42) | < 0.001 |
| Poor, < 30% | 5.49 | (4.49, 6.73) | < 0.001 |
| Centre volume, per 100 procedures | 1.06 | (1.03, 1.10) | < 0.001 |
| Operator volume, per 100 procedures | 0.92 | (0.74, 1.15) | 0.462 |
| Operator ACS volume, per 100 procedures | 1.18 | (0.84, 1.66) | 0.331 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.375; Hospital = 0.850 | | |

Supplementary Table 3c – Mixed-effect logistic regression model, in-hospital mortality, PPCI procedures only, N=37,732

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital mortality Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.30 | (1.14, 1.49) | <0.001 |
| Age, per 10 years | 0.78 | (0.51, 1.21) | 0.271 |
| Age-squared, per 10 years2 | 1.01 | (1.00, 1.01) | <0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 0.94 | (0.71, 1.25) | 0.693 |
| Black | 0.76 | (0.30, 1.94) | 0.564 |
| Other | 0.96 | (0.67, 1.38) | 0.843 |
| Shock | 5.68 | (4.83, 6.69) | <0.001 |
| Ventilated | 5.89 | (4.92, 7.05) | <0.001 |
| IABP | 1.23 | (1.00, 1.51) | 0.045 |
| CP | 4.00 | (2.30, 6.96) | <0.001 |
| Inotropes | 1.99 | (1.61, 2.47) | <0.001 |
| MI | 1.04 | (0.87, 1.24) | 0.681 |
| CABG | 0.73 | (0.54, 0.99) | 0.046 |
| Hypertension | 0.92 | (0.80, 1.06) | 0.250 |
| High-cholesterol | 0.92 | (0.79, 1.07) | 0.303 |
| Stroke | 1.35 | (1.06, 1.73) | 0.016 |
| VHD | 2.45 | (1.58, 3.81) | <0.001 |
| PVD | 1.61 | (1.25, 2.08) | <0.001 |
| Left-main stem targeted | 2.49 | (1.99, 3.11) | <0.001 |
| Diabetes | 1.49 | (1.27, 1.75) | <0.001 |
| Dialysis | 1.51 | (0.77, 2.93) | 0.2272 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.90 | (0.76, 1.07) | 0.239 |
| Current smoker | 0.82 | (0.68, 0.99) | 0.036 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 1.88 | (1.54, 2.31) | <0.001 |
| Poor, < 30% | 5.07 | (4.02, 6.40) | <0.001 |
| Centre volume, per 100 procedures | 1.05 | (1.01, 1.09) | 0.010 |
| Operator volume, per 100 procedures | 1.01 | (0.88, 1.16) | 0.909 |
| Operator primary volume, per 100 procedures | 1.15 | (0.71, 1.85) | 0.572 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.346; Hospital = 0.838 | | |

Supplementary Table 4a – Mixed-effect logistic regression model, in-hospital MACE, all procedures, N=138,627

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital MACE Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.22 | (1.12, 1.34) | < 0.001 |
| Age, per 10 years | 0.64 | (0.49, 0.85) | 0.002 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | < 0.001 |
| Ethnicity (White) | 1.00 | - |  |
| Asian | 1.01 | (0.85, 1.21) | 0.897 |
| Black | 0.77 | (0.45, 1.32) | 0.341 |
| Other | 0.88 | (0.72, 1.07) | 0.202 |
| Indication (Elective) | 1.00 | - |  |
| UA/NSTEMI | 1.86 | (1.62, 2.15) | < 0.001 |
| STEMI | 4.74 | (4.11, 5.48) | < 0.001 |
| Shock | 4.46 | (3.93, 5.07) | < 0.001 |
| Ventilated | 4.31 | (3.76, 4.96) | < 0.001 |
| IABP | 1.64 | (1.41, 1.92) | < 0.001 |
| CP | 3.80 | (2.40, 6.01) | < 0.001 |
| Inotropes | 2.03 | (1.70, 2.42) | < 0.001 |
| MI | 1.11 | (1.00, 1.23) | 0.054 |
| CABG | 0.85 | (0.71, 1.01) | 0.063 |
| Hypertension | 1.01 | (0.92, 1.11) | 0.811 |
| High-cholesterol | 0.96 | (0.87, 1.06) | 0.419 |
| Stroke | 1.42 | (1.21, 1.67) | < 0.001 |
| VHD | 1.58 | (1.25, 2.01) | < 0.001 |
| PVD | 1.30 | (1.11, 1.52) | 0.001 |
| Left-main stem targeted | 1.91 | (1.66, 2.20) | < 0.001 |
| Diabetes | 1.22 | (1.10, 1.35) | < 0.001 |
| Dialysis | 1.73 | (1.29, 2.33) | < 0.001 |
| Smoking (non-smoker) | 1.00 | - |  |
| Former smoker | 0.99 | (0.89, 1.10) | 0.893 |
| Current smoker | 0.85 | (0.75, 0.96) | 0.008 |
| LVEF (Good, > 50%) | 1.00 | - |  |
| Fair, 30-50% | 1.36 | (1.20, 1.53) | < 0.001 |
| Poor, < 30% | 2.98 | (2.56, 3.47) | < 0.001 |
| Centre volume, per 100 procedures | 1.02 | (1.00, 1.05) | 0.054 |
| Operator volume, per 100 procedures | 0.98 | (0.92, 1.05) | 0.630 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.292; Hospital = 0.608 | | |

Supplementary Table 4b – Mixed-effect logistic regression model, in-hospital MACE, ACS procedures only, N=91,178

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital MACE Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.19 | (1.08, 1.30) | < 0.001 |
| Age, per 10 years | 0.63 | (0.47, 0.83) | 0.001 |
| Age-squared, per 10 years | 1.01 | (1.00, 1.01) | < 0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 1.02 | (0.85, 1.24) | 0.807 |
| Black | 0.81 | (0.47, 1.40) | 0.449 |
| Other | 0.89 | (0.72, 1.11) | 0.293 |
| STEMI (vs UA/NSTEMI) | 2.50 | (2.25, 2.77) | < 0.001 |
| Shock | 4.57 | (4.02, 5.21) | < 0.001 |
| Ventilated | 4.38 | (3.80, 5.04) | < 0.001 |
| IABP | 1.48 | (1.26, 1.73) | < 0.001 |
| CP | 3.71 | (2.33, 5.89) | < 0.001 |
| Inotropes | 2.03 | (1.70, 2.43) | < 0.001 |
| MI | 1.08 | (0.96, 1.21) | 0.194 |
| CABG | 0.87 | (0.71, 1.07) | 0.183 |
| Hypertension | 0.98 | (0.89, 1.08) | 0.690 |
| High-cholesterol | 0.95 | (0.85, 1.06) | 0.335 |
| Stroke | 1.40 | (1.18, 1.66) | < 0.001 |
| VHD | 1.60 | (1.22, 2.09) | < 0.001 |
| PVD | 1.33 | (1.13, 1.57) | < 0.001 |
| Left-main stem targeted | 1.93 | (1.66, 2.24) | < 0.001 |
| Diabetes | 1.27 | (1.14, 1.42) | < 0.001 |
| Dialysis | 1.83 | (1.34, 2.51) | < 0.001 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.97 | (0.87, 1.09) | 0.640 |
| Current smoker | 0.84 | (0.74, 0.95) | 0.005 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 1.40 | (1.22, 1.60) | < 0.001 |
| Poor, < 30% | 3.17 | (2.72, 3.71) | < 0.001 |
| Centre volume, per 100 procedures | 1.03 | (1.01, 1.06) | 0.015 |
| Operator volume, per 100 procedures | 1.03 | (0.86, 1.22) | 0.770 |
| Operator ACS volume, per 100 procedures | 0.91 | (0.69, 1.19) | 0.494 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.320; Hospital = 0.640 | | |

Supplementary Table 4c – Mixed-effect logistic regression model, in-hospital MACE, PPCI procedures only, N=37,732

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Variable (reference)** | **In-hospital MACE Odds-ratio** | **95% confidence interval** | **Wald**  **p-value** |
|  |  |  |  |
| -Intercept- | - | - | <0.001 |
| Female patient | 1.16 | (1.03, 1.30) | 0.016 |
| Age, per 10 years | 0.60 | (0.43, 0.86) | 0.005 |
| Age-squared, per 10 years2 | 1.01 | (1.00, 1.01) | < 0.001 |
| Ethnicity (White) | 1 | - |  |
| Asian | 1.01 | (0.80, 1.28) | 0.939 |
| Black | 0.68 | (0.32, 1.46) | 0.323 |
| Other | 0.90 | (0.68, 1.20) | 0.477 |
| Shock | 4.57 | (3.95, 5.30) | < 0.001 |
| Ventilated | 4.58 | (3.89, 5.39) | < 0.001 |
| IABP | 1.35 | (1.12, 1.62) | 0.002 |
| CP | 3.41 | (2.04, 5.72) | < 0.001 |
| Inotropes | 1.90 | (1.55, 2.32) | < 0.001 |
| MI | 1.11 | (0.95, 1.30) | 0.183 |
| CABG | 0.81 | (0.59, 1.12) | 0.205 |
| Hypertension | 0.94 | (0.83, 1.07) | 0.348 |
| High-cholesterol | 0.97 | (0.84, 1.11) | 0.622 |
| Stroke | 1.42 | (1.13, 1.77) | 0.002 |
| VHD | 2.08 | (1.40, 3.10) | < 0.001 |
| PVD | 1.40 | (1.11, 1.77) | 0.005 |
| Left-main stem targeted | 2.21 | (1.79, 2.73) | < 0.001 |
| Diabetes | 1.39 | (1.20, 1.60) | < 0.001 |
| Dialysis | 1.44 | (0.79, 2.62) | 0.227 |
| Smoking (non-smoker) | 1 | - |  |
| Former smoker | 0.97 | (0.83, 1.12) | 0.647 |
| Current smoker | 0.80 | (0.68, 0.93) | 0.004 |
| LVEF (Good, > 50%) | 1 | - |  |
| Fair, 30-50% | 1.35 | (1.12, 1.63) | 0.002 |
| Poor, < 30% | 3.19 | (2.65, 3.84) | < 0.001 |
| Centre volume, per 100 procedures | 1.04 | (1.01, 1.07) | 0.018 |
| Operator volume, per 100 procedures | 0.98 | (0.88, 1.10) | 0.788 |
| Operator primary volume, per 100 procedures | 1.04 | (0.70, 1.55) | 0.852 |
|  |  |  |  |
| **Random-effect standard deviation estimate** | Consultant = 0.273; Hospital = 0.716 | | |